

**National Aeronautics and Space Administration
Washington, DC**

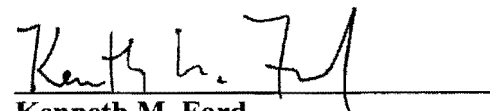
NASA ADVISORY COUNCIL

February 10-11, 2011

**NASA Headquarters
Washington, DC**

MEETING MINUTES


P. Diane Rausch
Executive Director


Kenneth M. Ford
Chair

**NASA ADVISORY COUNCIL
NASA Headquarters
Washington, DC
February 10-11, 2011**

**Meeting Report
TABLE OF CONTENTS**

Call to Order, Announcements.....	2
Remarks by Council Chair.....	2
Welcome by NASA Administrator.....	2
Independent Review of NASA Space Communications and Navigation (SCaN).....	4
International Space Station (ISS) Transition to Research Operations.....	5
Technology and Innovation Committee Report.....	6
Space Operations Committee Report.....	7
Science Committee Report.....	9
Information Technology Infrastructure Committee Update.....	9
Exploration Committee Report.....	10
Education and Public Outreach Committee Report.....	11
Audit, Finance, and Analysis Committee Report.....	12
Public Comments.....	13
Commercial Space Committee Report.....	13
Aeronautics Committee Report.....	15
NASA Annual Ethics Briefing.....	16
NASA Advisory Council Work Plan for 2011; General Discussion.....	16
Appendix A	Agenda
Appendix B	Council Membership
Appendix C	Meeting Attendees
Appendix D	List of Presentation Material

*Meeting Report prepared by
David J. Frankel
Consultant*

NASA ADVISORY COUNCIL
NASA Headquarters
Washington, DC
February 10-11, 2011

Thursday, February 10, 2011

Call to Order, Announcements

Ms. Diane Rausch, Executive Director, NASA Advisory Council (NAC or Council), called the meeting to order and welcomed the NAC members and attendees to NASA Headquarters in Washington, D.C. She stated that the NAC is a Federal advisory committee established under the Federal Advisory Committee Act. The meeting is open to the public. Meeting minutes will be taken by Mr. David Frankel, and will be posted to the NAC web site, www.nasa.gov/offices/nac, soon after the meeting. Each NAC member has been appointed by the NASA Administrator, Mr. Charles F. Bolden, Jr., based on the member's expertise. Each member is a Special Government Employee, subject to ethics regulations, and must recuse himself or herself from discussions on any topic in which there could be a potential conflict of interest. All presentations will be part of the public record.

Remarks by Council Chair

Ms. Rausch introduced Dr. Kenneth M. Ford, Council Chair. Dr. Ford welcomed everyone to the public meeting of the NAC. He reminded everyone that the Council is a Federal advisory committee reporting directly to the NASA Administrator, providing advice and recommendations across the full-breadth of the U.S. civil space program. This is the sixth meeting since the Council was restructured by NASA Administrator Bolden. He noted that last October 2010, they had met in Palmdale, California, at the AERO Institute in the Mojave Desert near NASA's Dryden Flight Research Center (DFRC). The Council members introduced themselves. Dr. Ford announced that Dr. Lawrence Smarr would be replacing Gen. Albert Edmonds as the Chair for the Information Technology (IT) Infrastructure Committee. Mr. Lars Perkins will serve as the Interim Chair for the Education and Public Outreach Committee while Mr. Miles O'Brien is on a leave of absence.

Welcome by NASA Administrator

Dr. Ford introduced the Honorable Charles F. Bolden, Jr., NASA Administrator. Mr. Bolden explained that the NAC is what its name implies: it is an organization on which he relies for advice and counsel pertaining to the Agency's day-to-day and strategic operations. Mr. Bolden presented NASA's Exceptional Public Service Medal to Gen. Albert Edmonds who, at Mr. Bolden's request, had chaired the IT Committee. Mr. Bolden stated that Gen. Edmonds could not have done a better job and is an incredibly valuable asset to the nation. Gen. Edmonds expressed his appreciation to Mr. Bolden for the opportunity to serve and thanked the Council Members for their support.

Mr. Bolden observed that it was budget time and that the 112th Congress has brought with it many new challenges. When NASA's FY 2012 budget is released on February 14, 2011, he remarked, it will be a "good news story" because NASA would "hold its own." There will be reductions across the government and it will be no different for NASA, but funding will be maintained for critical programs. NASA's new 2011 Strategic Plan will also be presented along with the budget. The last Strategic Plan was completed in 2006. The budget and the new Strategic Plan go hand-in-hand. The new Strategic Plan describes NASA's vision for the period 2011 to 2021. There are five overarching strategies in the Strategic Plan. The first is investing in technologies, with a focus on spurring innovation. The President's three big items for the Nation are "innovation, education, and building infrastructure." NASA will play a critical role in all three. The second overarching strategy is inspiring students to be the future scientists, engineers, explorers, and educators. Mr. Leland D. Melvin is NASA's new Associate Administrator for Education. He was the unanimous recommendation from the search committee; he has a very unique background and is an outstanding choice for this important position at NASA. The third overarching strategy is expanding our

international, academic, and inter-governmental partnerships. The President has asked that the “stovepipes” or walls between the Federal agencies be knocked down; NASA has been doing a good job at that. One of Mr. Bolden’s favorite partnerships is with the U.S. Agency for International Development on an Earth Science program called SERVIR (“to serve” in Spanish). The fourth strategy is committing to our environmental stewardship with NASA’s Earth Science Program, as well as green technology work with NASA’s Aeronautics Research Mission Directorate. The fifth strategy is securing the public trust. When people look at the new NASA Strategic Plan, they will see how NASA intends to implement these overarching strategies. Mr. Bolden, with Ms. Lori Garver, Deputy Administrator, Mr. David Radzanowski, Chief of Staff, and Mr. David Weaver, Associate Administrator for Communications, recently met for several hours with primary White House staff members and several Cabinet Secretaries to discuss NASA’s policy goals for the coming year as well as NASA’s communications strategy. Meetings of this kind are relatively rare as NASA is not a Cabinet-level organization.

Mr. Bolden described NASA’s current leadership development programs. There is a three-tiered process for developing future leaders. The first tier is NASA’s Foundations of Influence – Relationships, Success and Teamwork (FIRST) Program, which takes lower-level, very talented employees and prepares them for leadership in the organization. The second tier is called the Mid-Level Leadership Program, where people are brought in for 14 to 16 months and given an opportunity to travel around the Agency as well as other agencies, to spend time in organizations different from their own. The third tier, required at all Federal agencies, is the Senior Executive Service (SES) Career Development Program. In addition, NASA’s Chief Engineer’s Office now has a well-planned training structure for developing Program Managers and Project Managers to ensure that managers are well qualified before putting them into those positions. This has been a weakness in the past. NASA is working to restructure some programs to contribute to the national competitiveness. This can be seen in the area of Commercial Space. The development of a viable, sustainable commercial space industry will help the Nation to grow jobs and grow the economy. NASA also wants to maximize the sustainability of its “footprint.” This means taking a hard look at facilities that are seldom used, shedding unnecessary expenses that come with infrastructure, and looking for opportunities to partner with industry, academia, and other agencies to ensure that the Nation has the best facilities for research and development. NASA will also be contributing to the Nation’s innovation agenda.

Mr. Bolden noted the coming year will be very exciting. NASA has three Shuttle launches scheduled for the first half of the year. Two are flights that were on the pre-planned manifest: the upcoming STS-133 Discovery mission later this month, and the STS-134 Atlantis mission in April, the latter which is carrying to the International Space Station (ISS) an instrument called the Alpha Magnetic Spectrometer (AMS). This is an international project in partnership with the Department of Energy. It seeks to understand fundamental issues on the origin and structure of the universe and is expected to demonstrate the existence of anti-matter. AMS is an amazing story. It had been canceled, but it was brought back through its supporters’ persistence. The final Shuttle mission will be STS-135. It is essentially an ISS logistic reserves flight to mitigate the risks associated with integrating commercial assets for transporting cargo into low Earth orbit (LEO). The Stardust mission will rendezvous on Valentine’s Day with the Comet Tempel 1. This is an example of a “re-purposed” mission at NASA – Stardust’s primary mission has been completed. On the same day that STS-133 is launched, the Glory science mission will be launched from Vandenberg Air Force Base in California. The Solar TERrestrial Relations Observatory (STEREO) mission has enabled us to image the entire Sun. The Kepler planet-finding mission has discovered an extraordinary new planetary system with six rocky planets orbiting a sun-like star 2,000 light years away. NASA, Mr. Bolden observed, is turning science fiction into science fact. At the Super Bowl, NASA was represented by Robonaut 2 or R2, a dexterous robot that is a “member” of the STS-133 crew that will be launched on Space Shuttle Discovery in the near future. R2 will remain on the ISS for several years and roam its confines as a seventh crewmember. It has two hands with fingers and can grasp a baseball and shake your hand. It was created as a joint effort through a Space Act Agreement (SAA) with General Motors to fulfill an industry need to prevent human injuries on the production line as well as help NASA find ways to use robots do risky things in space.

Mr. Bolden noted that it has been an incredible year for the Commercial Space industry. In December, SpaceX launched Falcon 9 for its second flight. It contained the Dragon module, which will be used to carry cargo to the ISS. It is designed to eventually carry crew members to the ISS and LEO. This is the

first time in human history that an entity other than a nation has sent a capsule into space, have it orbit Earth, and recover it intact. The AJ-26 engine, which is an Americanized Russian engine that will be used on the Taurus II spacecraft, was recently test-fired at the NASA Stennis Space Center (SSC), and Mr. Bolden attended this test-firing in person. Mr. Bolden also recently visited Blue Origin, a company in the state of Washington that is developing its own spacecraft. Sierra Nevada, a company in Colorado, is developing a vehicle called the Dream Chaser that will carry humans to and from space. Great progress is being made in implementing the success of commercial space entities. The partnership between NASA and those commercial entities is vital. NASA's job is to explore and it is able to assume risks that others cannot afford to take. The Agency needs a way for somebody to take over LEO access. NASA hopes to hand that over to commercial entities in the next several years and is looking forward to an American-made vehicle. This is not intended to replace international cooperation. However, it should be noted that it takes 14 flights of the other international cargo vehicles such as the ATV (Europe), HTV (Japan), or Progress (Russia) to replace the mass brought to the ISS by a single Shuttle flight. Mr. Bolden thanked everyone, including the public, for attending the meeting.

Dr. Ford thanked Mr. Bolden for sharing his insights with the NASA Advisory Council.

Independent Review of NASA Space Communications and Navigation (SCaN)

Dr. Ford introduced Mr. W. James Adams (participating telephonically), Chair, SCaN Program Implementation Review (PIR) Standing Review Board (SRB), and Ms. Dolly Perkins (participating in person), Member, SCaN PIR SRB, who provided the Council with a status briefing on the recent independent review of the SCaN Program. Dr. Ford noted that three Council committees had collaborated in producing a recommendation for NASA to establish an independent review of SCaN.

Ms. Perkins explained that SCaN is a service organization responsible for providing the Agency's communications and navigation services, including systems engineering and planning, for flight missions' present and future needs and for supplying terrestrial communications services. It is one of the few programs located at NASA Headquarters. Mr. Badri Younes is the Deputy Associate Administrator for SCaN. Program Status Reviews (PSRs) are conducted by SCaN to determine its progress and its continuing relevance to the Agency's Strategic Plan. Those reviews include PIRs, which are used to provide Agency management with an independent assessment on the program's implementation. A chart was presented showing the SRB's membership. Ms. Perkins explained the program implementation review criteria and discussed the SCaN's technical and management strengths. She reviewed charts assessing the SCaN's product maturity and success criteria. Charts were also presented showing results from independent cost, budget, and schedule analysis.

Ms. Perkins discussed four major issues that the SRB had identified. First, the current Agency budget plan does not provide adequate funding for continued operation of the Space Network (SN). The SRB recommends direct funding by the Agency for FY 2013 and renegotiating SN reimbursable operations. Second, SCaN lacks Optical Communications funding. The SRB recommends establishing Optical Communications as a project to be directly funded by the Agency within SCaN. Third, funding is needed to support the Goddard Flight Dynamics Facility (FDF). The SRB wants the Agency to include the FDF within SCaN for both budget and architecture purposes. Fourth, SCaN does not have a Disruption Tolerant Networking (DTN) implementation plan. The SRB recommends that SCaN establish the next phase of DTN as a project and that appropriately skilled staff be expeditiously acquired. Charts highlighting other SRB concerns and observations were presented. The SRB believes that SCaN is well-managed, with a strong team working towards the common goal of an "integrated network of networks;" however, to implement the Agency's mandate for the future, additional funding is required.

Col. Eileen M. Collins thanked Mr. Adams and Ms. Perkins for the briefing and explained that SCaN is important for Space Operations. She is satisfied that it is being given the proper attention but believes that the requirements for SCaN need to be more specific. Dr. Charles F. Kennel expressed concern over the vagueness and openness of the requirements process, noting that with many more commercial entities and international partners, there would be many more users in the future. Mr. Younes explained that the review had been conducted a year ago and that the process is attempting to capture requirements for a structure

that is to last 30 to 40 years. SCA_N is now looking both at users' requirements as well as the Agency's vision. The Board is very active and includes NASA's Mission Directorates, Chief Engineer, and Chief Technologist. International users are supported and there are several forums, some of which are classified, to capture their needs. He explained that the next step in SCA_N's evolution is to go to the Ka-band and then go to optical. The Program wants to take the concept of the Internet up to space and then to deep space. Funding has not been stable, however. In response to a question from Dr. Raymond S. Colladay, Mr. Younes explained that they are ready to go operational with optical, subject to funding. JPL is working on a deep space optical terminal. Dr. Ford, addressing Col. Collins' concern, asked whether the requirements have become less vague since the review. Mr. Younes responded that the Agency has reviewed them and has concurred with the requirements.

Dr. Ford thanked Mr. Adams and Ms. Perkins for their presentation.

International Space Station (ISS) Transition to Research Operations

Dr. Ford introduced Mr. Mark Uhran, Assistant Associate Administrator for the ISS, Space Operations Mission Directorate (SOMD). Mr. Uhran briefed the Council on plans to enter into a Cooperative Agreement with a Non-Profit Organization (NPO) to schedule research opportunities on the ISS. He explained that managing a diversified, high-yield research and development (R&D) portfolio for the ISS National Laboratory requires an "honest broker" function that operates with objectivity. The ISS National Laboratory is equivalent to 120 Spacelabs, and its management presents a challenge that is a new order of complexity. The process must be defensible and transparent. A value-based, investment decision-making process presents the "best practice" for accomplishing this. The ISS will be hosting three R&D communities: NASA, non-NASA U.S. users, and international users. NASA's requirements are generated, managed, and funded by the responsible mission directorates and offices at NASA Headquarters. The remaining U.S. capacity is available to support non-NASA U.S. national needs for basic and applied research. Those requirements are generated, managed, and funded by external organizations that hold agreements with NASA. The requirements for the Canadian, European, Japanese, and Russian partners are generated, managed, and funded by the respective international partner. The basic governing policies for the ISS are found in the NASA Authorization Act of 2005, the NASA Authorization Act of 2010, the Federal Grant and Cooperative Agreement Act of 1977 (the "Chiles Act"), and NASA Procedural Requirement (NPR) 5800.1 Grant and Cooperative Agreement Handbook. An NPO will manage the requirements for the non-NASA U.S. users.

A chart was presented showing the top-level NPO work-flow. The process will be subject to existing NASA standards, procedures, and practices for payload integration and safety certification. The NPO's primary functions will include establishing a board of directors, stimulating non-government use, applying conventional peer-review processes, matching R&D projects to funding sponsors for applications development, managing the non-NASA science and technology portfolio using value-based principles, and conducting best-in-class communications on benefits and outcomes.

Mr. Uhran described four risks associated with using the NPO approach. First, organizational conflicts of interest must be avoided. Objectivity is critical because the NPO will be selecting users and establishing priorities. Second, a sound working relationship must be established between NASA and the NPO. Using a Cooperative Agreement is advisable due to the substantial involvement that is anticipated between the two parties. Third, an orderly process for integrating mission requirements across competing organizations is essential. A chart was presented showing how queuing models represent the "best practice" for mitigating this risk. Fourth, cargo transportation must be available. Commercial Resupply Services (CRS) are needed to provide sufficient up and down mass and will be critical for the ISS to succeed as a National Laboratory. A chart was presented showing the schedule for awarding a Cooperative Agreement to a NPO.

Mr. Uhran briefed the Council on the "Reference Model for the International Space Station U.S. National Laboratory" that was prepared by ProOrbis, LLC, at NASA's request. ProOrbis' expertise is in maximizing the value of existing assets, and it had no prior experience in space. Charts were presented from the ProOrbis study showing the ISS' competitive advantages, a nine-element supply chain of potential "choke" points, proposed purposes and features for the NPO, a capability architecture, and proposed structures for

the NPO's organization, board of directors, and a Science Collegium. ProOrbis recommended using a Cooperative Agreement because it is a relatively flexible agreement and would permit NASA to move to another type of legal agreement in the future if desired. Mr. Uhran emphasized that this was only a model and that the actual framework would be determined during the cooperative agreement proposal phase. In response to a question from Ms. Esther Dyson on how research projects would be selected, Mr. Uhran explained that the law requires 50 percent of the U.S. ISS capacity to be given to non-NASA U.S. nationals. The projects for that portion would be selected by the NPO, and the in-orbit allocation would be made using value-based principles.

Dr. Ford thanked Mr. Uhran for his presentation.

Technology and Innovation Committee Report

Dr. Ford introduced Ms. Esther Dyson, Chair, Technology and Innovation Committee, who briefed the Council on the Committee's recent activities. Ms. Dyson noted that Mr. Eric Haseltine has resigned from the Committee, and Mr. Gordon Eichhorst has become a member. The Committee met in October 2010 at the NASA Langley Research Center (LaRC), where it was briefed on what LaRC is doing to encourage innovation. She remarked that LaRC is using social media to market itself internally and externally. The Committee also met in January 2010 at the NASA John F. Kennedy Space Center (KSC). That meeting was timed to coincide with a meeting of the Chief Technologists from all NASA Centers. Ms. Dyson explained that having the Committee meet there demonstrates that it thinks what others are doing is important. Meetings are important because one of the main mechanisms for fostering innovation is communicating to others what is going on. Slides were presented showing research and technology capability areas at KSC. Slides were presented showing how NASA-derived technologies are saving lives and improving the quality of life across the country and around the globe, and how NASA-derived technologies are making the world a safer and more secure place. Ms. Dyson discussed the 14 roadmaps recently released by the NASA Office of Chief Technologist (OCT). These are available at www.nasa.gov/office/oct/home/roadmaps/index.html. She stated that while OCT is a great addition to NASA, there is a danger that OCT might become perceived as the source for all NASA innovation. She would prefer to see innovation spread like a "virus" throughout NASA. Ms. Dyson described a synthetic biology seminar that she had attended recently at NASA's Ames Research Center (ARC). She observed that if humans were going to colonize, it would be biology, not construction or engineering that would create a livable environment. She explained that that is what happened to Earth, and she suggested that it could be advanced through intelligent design without waiting for evolution.

Ms. Dyson presented for the Council's consideration two proposed observations on technology and innovation at LaRC and KSC. After discussion, they were approved by the Council as follows:

Both LaRC and KSC have significant and important technology and innovation work underway. The Technology and Innovation Committee was particularly impressed with the Multifunctional Electrospun fibers, the Electron Beam Free-form Fabrication, the Boron Nitride Nanotubes and plans for Airborne Wind Capture at LaRC. The Committee was impressed with the Cryogenics laboratory and research, the smart coating research for Corrosion and Detection and Protection, Dust Mitigation Technologies, and the "smart wiring" research and technologies at KSC. Many of these technologies have various immediate or potential commercial applications. The Committee encourages the continuation of this grass-roots innovation and research at all NASA Centers. The Committee believes the adoption of Center Chief Technologists at all of the NASA Field Centers encourages innovation by the NASA Civil Servant workforce.

During the Committee's visit to both LaRC and KSC, there seemed to be issues with technologists being isolated and not sharing or even seeking knowledge beyond their own organization or Center. Additionally, in some cases researchers need to be encouraged to be less risk-adverse – especially in the technology development and commercialization arena. More discussion needs to happen throughout the Agency about managed risk and pushing the risk envelope in innovation and technology development – and making the distinction between risk that one can learn from and risk that endangers lives. NASA should consider changes to the reward system to encourage researchers to take informed risks.

Ms. Dyson presented for the Council's consideration a proposed observation on NASA's approach to intellectual property. The Council approved the observation as follows:

NASA should consider reviewing its approach towards intellectual property protection and administration. A more active approach could assist in reinforcing the Agency's reputation as a technology hub, validate the efforts of leading NASA technologists, safeguard the public investment into NASA technology developments, and provide a more direct link between specific NASA technology and how it benefits humankind.

Ms. Dyson presented for the Council's consideration a proposed finding on knowledge management in the area of innovation, research, and technology development. Col. Collins noted that the proposed finding was similar to a previous finding by the Space Operations Committee, and suggested that it now be advanced as a recommendation. Mr. Lars Perkins explained a software system used by Google to facilitate knowledge management. Dr. Ford suggested that the NAC should look more closely at the approach taken by Google. Mr. Robert M. Hanisee recommended bringing groups together in weekly meetings to share best practices. Ms. Dyson observed that standards are needed in finance and that the challenge for innovation is a need for diversification. At Dr. Ford's suggestion, action on the item was deferred so that it could be reviewed jointly with the Space Operations, Education and Public Outreach, and Information Technology Infrastructure Committees, and brought back for action at the Council's August 2011 meeting at ARC.

Ms. Dyson presented for the Council's consideration a proposed finding on underutilized launch capacities as follows:

The Committee also discussed the underutilization of NASA and commercial Expendable Launch Vehicles and Reusable Launch Vehicles launch capacities for secondary flight payloads for technology validation and demonstrations. The Committee believes that NASA should encourage missions with additional payload capacity to make it available for research. Secondary payloads are vital for testing and proving many technology capabilities, especially in times of constrained budgets and resources.

Following Council discussion, the above was not approved as a finding, but became a recommendation as follows:

The Committee recommends that the NASA Administrator encourage the use of secondary payloads on future NASA and commercial missions as an important capability for testing, validating and demonstrating new technologies and scientific payloads in the coming years.

The Council approved this recommendation.

Ms. Dyson asked about the status of a prior NAC recommendation regarding the FedTraveler program. Ms. Rausch advised that NASA's response was in the NASA Administrator's Suite awaiting signature. Dr. Ford noted that the recommendation had generated considerable discussion. He thanked Ms. Dyson for her presentation.

Space Operations Committee Report

Dr. Ford introduced Col. Eileen Collins, Chair, Space Operations Committee. She described the Committee's membership. The Committee recently met with Mr. Bolden, who explained that his number one priority was safely flying the remaining three Shuttle missions. Col. Collins described several briefings recently received by the Committee, which included: the Space Shuttle retirement; the ISS; and NASA's plans to use a Non-Profit Organization to manage the National Laboratory on the ISS. She presented charts showing how the Space Shuttle Program workforce was being affected by the Shuttle phase-out. The Committee is satisfied that this has been handled as well as it could be handled. She discussed the delay in flying STS-133, where cracks had been found in the external tank's stringers. Col. Collins reported that the problem had been handled very well by the Shuttle Program. She expressed a hope that the commercial providers would use it as a model for how problems should be resolved. Dr. Colladay stated that the policy

has always been “don’t fly unverified failures.” Col. Collins described the work being performed on the ISS and presented a slide on ISS research accomplishments. She discussed the Committee’s perspective on commercial spaceflight initiatives. She stated that NASA is progressing with a good plan.

At the request of the Commercial Space Committee, the Space Operations Committee has looked at the Commercial Crew Requirements from an operational perspective. NASA has eliminated using the phrase “human rating” on its requirements document. The new title is “Commercial Crew Transportation System Verification Requirements for NASA Low Earth Orbit Missions.” It was the sense of the Committee that the commercial companies are being overloaded with too many requirements, too much specificity, too many details, too much paperwork, and too much bureaucracy. On the other hand, there is a good rationale for the requirements; for example, transferring lessons learned. NASA has established a new committee, the Commercial Crew Requirements Team, to review these requirements.

The NASA Administrator met with the Committee and discussed the benefits from the Commercial Crew Program. Success of this initiative is essential to enable NASA to conduct future deep space exploration. Commercial Crew has to succeed in order to allow NASA to focus on exploration. In response to a question from Mr. Hanisee, Col. Collins clarified that those are words from NASA leadership. Commercial Crew has to succeed to keep the ISS running and free resources to operate beyond LEO. She explained that everybody realizes that Mars is the ultimate destination, and we are not going to get there if we are stuck in LEO. Ms. Marion Blakey asked whether a cost-benefit analysis exists that shows how resources would be freed up and become available for a mission to Mars. Col. Collins agreed to research whether that analysis has been performed. Dr. Colladay opined that “this has the makings of a replay of a bad movie” because it all depends on whether there are commercial customers other than NASA for a commercial launch. If NASA is the only customer, then the launch costs will remain the same. Col. Collins explained that the eventual costs will be, and the timing for commercial’s ability to fly is a risk that NASA is facing at this time. Ms. Dyson opined that the market would be much larger than expected, similar to what happened with the growth of the Internet. She has seen a lot of interest from people outside the traditional space community for everything from asteroid mining for rare earth metals to entertainment. Col. Collins stated that our country’s future strength, status, and economy are tied to our spaceflight program. Ms. Dyson responded that a lot of the U.S. prestige now is due not only to the Army and our great principles, but also to the Internet and the economic benefits flowing from it. It, too, was difficult to quantify at the beginning. Col. Collins asserted that we are going into an uncertain period: “If we build it, will they come?” Ms. Dyson responded that they will.

Col. Collins presented for the Council’s consideration a proposed recommendation on communicating the human spaceflight vision. She explained it would help to motivate the workforce, produce a more informed and, thereby, more productive workforce, improve NASA’s public image, and eliminate the perceived competition between LEO and deep space programs. In response to a question from Dr. Ford, Col. Collins’ explained that the recommendation provides goals and objectives that will help implement the impending new 2011 NASA Strategic Plan. Col. Collins presented the following recommendation:

The Space Operations Committee has observed that there is a disconnect between the human spaceflight vision at the top levels of the Agency and the perception that is prevalent throughout the NASA civil servant and contractor workforce. The success of commercial launch to low Earth orbit is imperative to the success of the NASA exploration beyond low Earth orbit, including the capability for multiple destinations, with the ultimate goal being Mars. We recommend that a clear vision of the overall NASA direction of its human spaceflight program be communicated to the workforce and the public, to include the commercial and deep space exploration components. NASA should publish specific goals and objectives, and communication should include an enrollment plan, town hall meetings, the NASA website, social media, and other forums. Follow-up will be required to ensure that the message is received, and that actions are underway commensurate with the vision.

After further discussion, the Council approved this recommendation.

Col. Collins concluded her briefing to the Council with a short video entitled “Reach.” It may be seen at <http://buzzroom.nasa.gov/multimedia/videos/933/>.

Dr. Ford thanked Col. Collins for her presentation.

Science Committee Report

Dr. Ford introduced Dr. Wesley T. Huntress, Jr., Chair, Science Committee. Dr. Huntress described the Committee's membership. There are two new members: Dr. Eugenia Kalnay and Dr. Dave McComas. Dr. Huntress described a new Task Group on Analysis Groups (TagAG) that was recently approved by Administrator Bolden. It will perform a short-term study on how best to update Planetary Analysis Groups to serve the science needs of the Science Missions Directorate (SMD) and the Exploration Systems Mission Directorate (ESMD). It will be chaired by the NASA Chief Scientist.

Dr. Huntress briefed the Council on recent science results. The Cloud-Aerosol Lidar and Infrared Pathfinder Satellite Observation (CALIPSO) spacecraft has observed an unusually high mountain wave polar stratospheric cloud extending to altitudes above 30 km near the east coast of Greenland. The Stratospheric Observatory for Infrared Astronomy (SOFIA), a world-class airborne observatory that will complement the Hubble Space Telescope, has flown its first science missions. It can fly at 41,000 feet, which allows it to see in the infrared. It is able to obtain spectroscopic data at extremely high resolutions that cannot be obtained with space-borne telescopes. EPOXI (an acronym for the EPOCH and Deep Impact combined extended missions) had an encounter with the Comet Hartley 2. The Stardust spacecraft will soon fly by the Comet Tempel 1. The Kepler Mission, in just the first four months of operation, has found over 1,200 planetary candidates. Sixty-eight are Earth-size. Kepler finds planets by looking at the dimming of a star as the planet crosses in front of it. Many of the planets it has found are in the "Goldilocks" or temperate zone. Hubble has found the most distant galaxy candidate ever seen in universe – a new galaxy that was formed only 412 million years after the "Big Bang." NASA's twin Solar TERrestrial Relations Observatory (STEREO) probes moved into position on opposite sides of the Sun and are now beaming back uninterrupted images of the entire star – front and back. Dr. Huntress presented a chart, entitled "Year of the Solar System," showing the current schedule for missions throughout the Solar System. A slide was shown on the Near Earth Object Wide-field Infrared Survey Explorer (NEOWISE) mission, which is drawing to a close and is credited with discovering 133 near-Earth asteroids. Twenty-one are potentially hazardous to Earth. A slide was shown on the MErcury Surface Space ENvironment GEochemistry and Ranging (MESSENGER) mission to Mercury. It was launched in 2004 and has flown by Mercury three times, and is scheduled for orbit insertion on March 17, 2011. Dr. Huntress discussed SMD-wide programmatic issues. Launch vehicle costs are rising and guaranteed performance, i.e., payload mass to specific orbit, is being reduced under the new NASA Launch Services II contract. The current Congressional Continuing Resolution (CR) has capped spending rates at FY 2010 levels. New starts, including a production facility for plutonium (Pu)-238, are precluded. Dr. Huntress presented a chart showing planetary missions nearing launch and a chart showing NASA's current astrophysics mission portfolio. He discussed the status of the James Webb Space Telescope (JWST), which will be the successor to the Hubble. It is 100 more times sensitive and can do more in one hour than what the Hubble does in three days. An independent Comprehensive Review Panel has confirmed that there are no technical issues on JWST. The Panel made 22 recommendations and all have been accepted by NASA. There is a new Project Manager, Mr. William Ochs, and a new Business Manager, Mr. Richard Ryan. The JWST Project will report directly to the Director of NASA Goddard Space Flight Center. The JWST Program will report to the SMD Associate Administrator, Dr. Ed Weiler, and to NASA Associate Administrator, Mr. Chris Scolese.

Dr. Ford thanked Dr. Huntress for his presentation.

Information Technology (IT) Infrastructure Committee Update

Dr. Ford reported that Dr. Lawrence Smarr will be chairing the Committee, replacing Gen. Albert Edmonds. Unfortunately, Dr. Smarr could not attend this Council meeting. Its first meeting under his chairmanship was also delayed. The Committee's first task will be to review its work plan.

Exploration Committee Report

Dr. Ford introduced Mr. Richard Kohrs, Chair, Exploration Committee. Mr. Kohrs announced that the Committee had two new members: Ms. Carolyn Griner and Mr. Dick Malow. The Committee has held two fact-finding meetings. He discussed the NASA Authorization Act of 2010, which has been approved by Congress and the President. It demonstrates bipartisan support for human exploration beyond LEO. The law authorizes extension of the ISS until at least 2020, provides strong support for a commercial space transportation industry, authorizes development of a multi-purpose crew vehicle (MPCV) and heavy lift launch capabilities, designates a "flexible path" approach to exploring near-Earth asteroids and Mars, and provides for new space technology investments to increase capabilities beyond LEO. ESMD is operating under a Continuing Resolution and is using internal study teams to develop plans in response to the 2010 Authorization Act. The study team efforts are based on the Authorization Act and ongoing analysis by the Human Exploration Framework Team (HEFT), which provides architectural planning and analysis for human exploration to support NASA senior leadership decision-making.

Mr. Kohrs described a recent Robonaut 2 (R2) ISS flight demonstration. He also discussed the SpaceX status. Falcon 9's maiden flight successfully reached orbit on June 4, 2010, and successfully demonstrated the primary mission: insertion into orbit, Dragon module separation, and safe reentry. All other mission objectives were successful. The Demo Flight 2 mission planned for June 2011, includes a rendezvous and proximity operations with the ISS. The Demo Flight 3 mission, planned for September 2011, includes a berthing operation with the ISS and a cargo transfer demonstration. NASA is considering a SpaceX proposal to combine Demo Flights 2 and 3. To date, SpaceX has been paid \$258 million out of the \$278 million available under its Space Act Agreement with NASA. Mr. Kohrs discussed Orbital Science Corporation's (Orbital's) status. It has received \$157.5 million out of the \$170 million available under its SAA with NASA. It has a Commercial Orbital Transportation Services (COTS) demo flight planned for October 2011, which will include ISS proximity and berthing operations. NASA is currently in a "black-out" with industry regarding Commercial Crew Development Round Two (CCDev 2). Its goal is to advance orbital commercial crew transportation systems (CTS) concepts and accelerate the availability of U.S. CTS capabilities. NASA was required by law to release its human ratings processes and requirements no later than December 10, 2010. On December 9, 2010 NASA released that document, which is entitled "Commercial Crew Transportation System Certification Requirements for NASA's Earth Orbit Missions."

Mr. Kohrs presented slides on the Space Launch Systems (SLS) Reference Vehicle Design, the SLS approach, and SLS near-term activities. The baseline SLS path is an Ares/Shuttle-derived system. The 2010 Authorization Act requires the vehicle to have the capability to lift the MPCV and to serve as a backup system for supplying ISS cargo requirements or crew delivery requirements not otherwise met by available commercial or partner-supplied vehicles. NASA will work with industry on multiple affordability options for heavy lift. NASA will also validate that the Ares/Shuttle derived solution is the most cost-effective solution and provide an alternative acquisition plan in the event that the Reference Vehicle Design is unaffordable. Final decisions on NASA's plans for the SLS will be made during the acquisition strategy review process in early 2011. Mr. Kohrs discussed the MPCV. The 2010 Authorization Act requires that it serve as the primary crew vehicle for missions beyond LEO and provide the means to deliver crew and cargo to the ISS as a back-up to commercial crew and international partners. Based on these requirements, NASA has selected the beyond-LEO version of the Orion design as the MPCV Reference Vehicle. Final decisions on NASA's plans for the MPCV will be made during the acquisition strategy review process in early 2011. Mr. Kohrs presented a chart on Strategies and Design Reference Missions (DRMs). He described the capability-driven framework; it enables multiple destinations and provides increased flexibility, greater cost-effectiveness, and sustainability. He presented slides on the expansion of human space exploration capabilities, notational architecture elements that may be required, and charts showing the technology that will be needed for various destinations.

Mr. Kohrs presented for the Council's consideration a proposed finding on the HEFT report and its implementation. The Council approved the finding as follows:

The NAC Exploration Committee applauds the Human Exploration Framework Team (HEFT) report. The HEFT approach has evolved over the last months with a strategy able to support multiple mission options

that could be selected in future decisions, based on budget availability. The Committee agrees with HEFT's conclusion that a capabilities-based strategy for future exploration can be an excellent basis for a sustainable, realistic, and affordable space exploration program.

The Committee is concerned about how NASA will handle the management aspects of this strategy; e.g. acquisition strategy, contract incentives, internal organization within NASA. The Committee also encourages NASA to continue its dialogue with external organizations to seek best-practices and benchmarks for successful affordability initiatives. (This includes initiatives currently underway in the Air Force, and the initiatives defined in the Defense Science Board's 'Adaptability Study.')

Mr. Kohrs presented for the Council's consideration a proposed recommendation on NAC Committee meetings. It provides as follows:

The Council recommends to the Administrator that its nine committees meet as a group and/or in selected groups, at least once a year, with an agenda that cuts across the interests of the committees and with an opportunity to hear from the Administrator and share their perspectives on issues related to NASA activities.

Dr. Ford explained that this would be allowed under the current committee structure, but that all committees do not need to be together at each meeting. Mr. Perkins asked whether the committees could meet together "virtually." Dr. Ford responded that virtual meetings should be explored as an option for those who can't come. After further discussion, the Council approved the recommendation, with the caveat that Dr. Ford and Mr. Kohrs develop language to modify the recommendation to permit groups of committees to meet together, rather than all nine committees at the same time.

Dr. Ford thanked Mr. Kohrs for his presentation.

Education and Public Outreach (EPO) Committee Report

Dr. Ford introduced Mr. Lars Perkins, Interim Chair, EPO Committee (filling in for Mr. Miles O'Brien, who is on a temporary leave of absence). Mr. Perkins described the Committee's membership. In December, they held an event called "NASA 101: What Every Filmmaker Should Know about the Innovative World of NASA." There were over 100 industry participants, including Pixar, Sony, Columbia, and Fox. There will be a possible industry-sponsored follow-up in two years. He presented a short video showing his son watching the launch of STS-131, and he recommended capturing the experience to inspire schoolchildren. The Committee intends to support Mr. Leland Melvin, the Agency's new Associate Administrator for Education, who has made several outstanding recommendations. The Committee finds four themes in those recommendations: first, focus under a unifying message; second, amplify NASA resources through partnerships; third, streamline and simplify the partnership process; and fourth, inspire students by inspiring teachers. Mr. Perkins noted that in 2009 the Council had adopted a Committee recommendation to include NASA's Communications and Education Offices during all phases of mission development. The Committee believes that the same philosophy should be integrated into the Commercial Orbital Transportation Services (COTS) contracts, so that the COTS partners understand the importance of the public outreach mission and integrate it into their mission planning.

The Committee was thrilled with SpaceX's success in launching the Falcon 9, but was disappointed in the access for coverage that was afforded to NASA TV. It was only through heroic effort by Mr. David Weaver, NASA's Associate Administrator for the Office of Communications, that arrangements were made for a post-launch press conference and contingency plans were developed in case the launch had not been successful. The Committee met with the Commercial Space Committee to discuss integrating public outreach into COTS mission planning. It was determined that this would be a laudable goal, but only if it could be done in a manner that supported the partners' commercial goals, including the preservation of proprietary information, and did so without imposing unnecessary bureaucratic burdens. He described the "Three I's": Involve the world in the adventure of spaceflight and exploration; Inform the public of the benefits of investing in spaceflight; and Inspire the next generation of scientists, engineers, and explorers.

The Committee believes that communication with the public is important to the long-term success of the commercial partners. Mr. Perkins explained that it is important for the commercial partners to carry forward NASA's ability to communicate both success as well as failure in the exploration mission. The Committee will present a joint recommendation on this with the Commercial Space Committee. Mr. Perkins discussed the "taxi driver" problem, which is that the public's predominant image of NASA is: "NASA? They got us to the moon." He explained that NASA has at least two audiences. NASA has a statutory obligation under the 1958 Space Act to inform the public. There is also a very savvy scientific audience that is interested in all the details. When reaching the public, it is best to tell a story. People will generally remember only three things from a story. The Committee is encouraging the NASA Office of Communications to figure out what that message should be so that NASA can "relentlessly repeat that theme over and over again." The theme has to be relentlessly included in every communication, press release and other "touch point" that NASA has with the public. He described what has been characterized as the "Why" Project as an example for the NASA messages that should be communicated to the public. It is still under development and currently states a new NASA Vision as follows: *"To reach for new heights and reveal the unknown so that what we do and learn will benefit all humankind."* In the future, the Committee intends to assist in translating NASA's strategic vision into a clear public message and to help the Office of Communications coordinate message streams.

Dr. Ford thanked Mr. Perkins for his presentation.

Audit, Finance, and Analysis Committee Report

Dr. Ford introduced Mr. Robert M. Hanisee, Chair, Audit, Finance, and Analysis Committee. Mr. Hanisee reviewed the Committee's agenda from its meeting on February 8, 2011. He described the results from NASA's FY 2010 Financial Statement Audit by Ernst & Young (E&Y). The Agency received a qualified opinion. Mr. Hanisee explained how it was achieved and described it as a major breakthrough when compared to the audit results over the past seven years. There were no material weaknesses, and there were significant deficiencies in only two areas: contractor-held property, plant & equipment (PP&E), and estimating environmental remediation costs. He explained that a qualified opinion means that except for the effect of the qualifications, the financial statements present fairly, in all material respects, the financial position and results of operations in conformity with Generally Accepted Accounting Principles.

The Committee met with Dr. Elizabeth "Beth" Robinson, NASA's Chief Financial Officer (CFO). Mr. Hanisee presented a chart showing the organization of the Office of the CFO (OCFO). He described the OCFO Strategic Plan. OCFO's vision is to be the credible expert, trusted advisor, and source of quality information on matters related to finance and resources, including the management of associated risk, for NASA programmatic and institutional decision-making. He described the NASA Financial Steering Group (FSG). It is the key communication forum for the NASA financial community, and it helps to institutionalize policies and processes. Mr. Hanisee described the Continuous Monitoring Program. It is a proactive program to systematically monitor internal controls in key areas selected because of their importance and risk to the organization. It provides an ongoing assurance that internal controls are operating as intended. He provided an update on NASA's financial systems. The use of electronic signatures for contracting documents will be implemented. Mr. Hanisee discussed NASA's unfunded environmental liabilities. One deficiency previously noted by the auditors was the lack of a continuing validation program for the IDEAL program borrowed by NASA from the U.S. Navy. Validation tests of the IDEAL models for selected remediation elements at five NASA Centers indicate, however, that overall the model estimates are within 12 percent of the actual costs experienced, which is better than the industry norm. User-defined estimates will be used in the future and this deficiency now appears to be resolved. Mr. Hanisee described NASA's Enterprise Value Management (EVM) Capability Project. There have been inconsistencies between the plan and its performance, leading to concerns over whether EVM is useful for the Agency.

Mr. Hanisee discussed the NASA Shared Services Center (NSSC), located at the NASA Stennis Space Center. The NSSC was established in 2006 to provide cost avoidances through consolidating, standardizing, and automating transactional and administrative activities in procurement, financial

management, human resources, and information technology. Charts were presented on NSSC metrics and key performance indicators. Surveys show overall satisfaction with the NSSC. The average cost per transaction is higher than expected. NASA's Inspector General (IG) audited the NSSC from February 2009 through January 2011 to determine whether the consolidation and transfer of institutional support services from NASA Centers to the NSSC was conducted in a timely, efficient, and cost-effective manner. Services were not transferred timely or as planned. Two hundred civil service positions were expected to be eliminated; however, only 50 were. The IG was unable to determine whether NASA had achieved its goals because the original business case had been based on flawed data. A slide was presented showing recommendations on the NSSC that the IG provided to the NASA Associate Administrator for Mission Support.

Mr. Hanisee discussed the Space Shuttle transition and retirement. Three more flights remain on the Space Shuttle Program (SSP) Manifest. He presented a chart showing that there are 1,162,856 line items for property belonging to the Program that will need to be distributed, and he showed the timeline for a baseline SSP property divestment plan. He described the Monthly Business and Accounting Report (MBAR), which is a new initiative to provide financial information and data to all managers in the Agency. He presented several procurement vehicle closeout summary charts. Mr. Hanisee concluded by describing the roadmap to a clean financial statement audit opinion. The 2011 audit has not yet begun. NASA's Inspector General, Mr. Paul Martin, has decided to put the external audit work out for bid, even though three years are left on the E&Y contract. One element that may present a problem in the next audit relates to disclosing asbestos cleanup costs. There is a question as to whether this is a health issue or an environmental liability issue.

Dr. Ford thanked Mr. Hanisee for his presentation and noted that the Audit, Finance, and Analysis Committee had been one of the more effective NAC committees over a long period of time. Mr. Hanisee stated that the credit should go to Mr. Terry Bowie, former Deputy CFO, and his staff.

Public Input

Dr. Ford gave the public an opportunity to comment. Mr. Keith Cowing referred to the discussion relating to NASA communications and advised that it would be best for NASA to keep its messages as simple as possible. Mr. Charles J. Divine opined that artists, when providing an artistic experience, are interested in knowing what is wanted by different generations. He asserted that different generations require different approaches, and encouraged NASA to consider inter-generational differences and approaches.

The meeting was adjourned for the day.

Friday, February 11, 2011

Call to Order

Ms. Rausch called the meeting to order.

Announcements

Dr. Ford welcomed the Council Members back for the second day of the NAC meeting. He described the agenda for the day and reviewed the presentations from the previous day.

Commercial Space Committee Report

Dr. Ford introduced Mr. Brett Alexander, Chair, Commercial Space Committee. Mr. Alexander described the Committee's membership and reviewed its past observations, findings, and recommendations. He provided a budget update on the FY 2011 NASA Authorization Bill. He also provided an update on NASA's Commercial Crew program. The Authorization Bill establishes the Commercial Crew program as the "primary means" of transporting NASA astronauts to and from the ISS. It provides \$1.3 billion over

three years for developing commercial capabilities. He added that Sen. Nelson has stated that Commercial Crew would be “fully funded over six years” at \$5.8 billion, the same level as the President’s FY 2011 Budget Request. Commercial Crew Development Round 1 (CCDev 1) provided \$50 million in Recovery Act funding for Commercial Crew technology acceleration. Five companies have been awarded SAAs: Sierra Nevada Corporation, United Launch Alliance, Blue Origin, Paragon Space Development Corp., and The Boeing Company. Round 2 (CCDev 2) will use FY 2011 Commercial Crew funding to fund “significant maturation of commercial crew systems.” Mr. Alexander described the status of the SpaceX and the Orbital Science Corporation flight demonstration programs. He explained that the advantage to NASA from SpaceX’s proposal to combine its next two demonstration flights would be to accelerate the schedule for getting supplies to the ISS, but the downside would be increased risk of meeting the flight objectives in one flight instead of two. Orbital has its first demonstration flight scheduled for later this year. He provided an update on the Commercial Reusable Suborbital Research (CRuSR) program. Its purpose is to fly science, technology, and education payloads on low-cost commercial suborbital vehicles. The NASA Authorization Bill provides \$15 million a year for this program over the next three years. Reports on an acquisition strategy for the commercial markets are being prepared. A commercial market assessment team is being led by Mr. Philip McAlister in ESMD.

Col. Collins asked whether the commercial market for suborbital flights has been identified, aside from commercial passengers, or “space tourists.” Mr. Alexander responded that the answer depends on what is meant by “commercial.” Col. Collins stated that she was interested in paying customers. Mr. Alexander advised that paying customers for payloads include NASA, other government agencies like the Air Force and the National Science Foundation (NSF), and universities, which, he explained, tend to get their funds from the government. The commercial market tends to be scientific. The scientific market is real; however, it is unclear whether that market is robust enough to justify the entire expense. Passenger carriage will be more important than scientific. In response to a question from Ms. Dyson about employment implications from commercialization, Mr. Alexander advised that a new study on this subject was being conducted by NASA and should be ready by the next NAC meeting. Ms. Dyson opined that fewer employees should be required if greater efficiencies are obtained through commercialization. She added that there is sensitivity over this not being just a NASA market. Mr. Alexander reported that the Committee discussed the definition of “commercial.” It calls for the private sector to bear a reasonable portion of the investment risk; however, reasonable minds can disagree on what is meant by “reasonable.”

Mr. Alexander presented for the Council’s consideration a proposed recommendation for NASA to present its commercial crew transportation service requirements as goals. Mr. Alexander explained that the Committee was concerned with “synergy.” Dr. Ford expressed concern because the cargo program is not analogous with crew and, with respect to crew, there is a need for baseline requirements. Col. Collins and Mr. Alexander discussed the requirements contained in the documents referenced in the proposed recommendation. Col. Collins believes in the need for requirements, but it could be that too many are being imposed on the potential commercial providers. Dr. Kennel explained that the government would retain the discretion to use a Request for Proposal (RFP) with real requirements and that it would be very discouraging to the commercial side to halt the entire enterprise just due to concerns over human safety. They should be encouraged to go forward with the relatively easy cargo resupply effort. Mr. Alexander explained that the proposed recommendation is not about safety. Dr. Ford observed that requirements are developed for nearly every item the government buys and that even private citizens set requirements when, for example, they buy an automobile. The customer reserves the right to specify requirements such as the size of the vehicle, the fuel economy, and the seating capacity. Ms. Dyson explained that there is value in going beyond the baseline and there is value in having multiple suppliers. The challenge is that NASA wants to obtain diversity and avoid redundancy. Mr. Alexander withdrew the recommendation so that it could be developed in conjunction with the Space Operations and Exploration Committees. Dr. Ford concurred with that course of action and asked that it be handled on a priority basis. He noted that if there were going to be the same level of specificity and same number of requirements as in Constellation then there would not likely be much cost savings, and there may not be any providers in the non-government sector. Mr. Perkins suggested that public outreach be included in the requirements as a goal.

Mr. Alexander presented for the Council’s consideration a joint recommendation with the EPO Committee on integrating public outreach into mission planning and commercial partnerships. Dr. Ford stated that this

recommendation would be especially applicable in the development stage. Mr. Perkins stated that EPO is trying to get a seat at the table as mission requirements are developed and ultimately would like to see education and public outreach be included in procurement proposals and considered in the selection process. Col. Collins stated that her Committee would be thrilled with the recommendation. The recommendation was presented as follows:

The NASA Advisory Council Education and Public Outreach Committee and Commercial Space Committee jointly recommend that:

NASA encourage existing Commercial Orbital Transportation Services contractors to work with NASA's Office of Communications to integrate public outreach into mission planning and operations.

NASA's Office of Communications draft a recommended commercial partner public outreach and participatory exploration policy (including contingency media/communication plans) to serve as a guideline when developing future partner agreements.

The Council approved this recommendation. Dr. Ford thanked Mr. Alexander for his presentation.

Aeronautics Committee Report

Dr. Ford introduced Ms. Marion Blakey, Chair, Aeronautics Committee. Ms. Blakey reviewed the areas explored at the Committee's last meeting and presented a chart showing NASA's Aeronautics budget from FY 2007 through FY 2015. She described a new organization for Strategy, Architecture and Analysis (SAA), headed by Mr. Robert Pearce, within NASA's Aeronautics Research Mission Directorate (ARMD). SAA will provide a strategic systems analysis capability focused on understanding the system-level impacts of NASA's programs, the potential for integrated solutions, and the development of high-leverage options for new investment and partnership. It is expected to foster innovative thinking about aviation's future. Ms. Blakey discussed aviation's environmental impact. Fuel efficiency is important. In 2008, the major carriers burned 20,000,000,000 gallons of fuel and the Air Force burned another 5,000,000,000 gallons. She observed that, while aviation contributes only 3 percent of air pollution, the industry feels it is important to contribute to reducing that footprint. NASA has a two-fold approach to reducing harmful emissions: fundamental research is being performed within the Fundamental Aeronautics Program (FAP), and integrated systems-level research is being performed in the Integrated Systems Research Program (ISRP). Ms. Blakey reviewed a slide on various FAP projects that are in response to the environmental challenge to reduce harmful emissions. She described FAP's Aviation Alternative Fuel eXperiment (AAFEX). This is considered to be the first ever test of 100 percent synthetic fuel. Although some seal issues were encountered, significant reductions in particulates and aerosol emissions were obtained. A slide was presented on ISRP projects in response to an environmental challenge to address CO₂ emissions.

Ms. Blakey described key Federal Aviation Administration (FAA) research and development initiatives involving the environment and energy; these cover improved science and modeling, operational procedures, engine and airframe technologies, alternative fuels, and new policies. She presented a slide illustrating how NASA is supporting important partnerships in emissions research. These include the FAA CLEEN Program, the Versatile Affordable Advanced Turbine Engine Program, the Commercial Aviation Alternative Fuels Initiative, the Aviation Climate Change Research Initiative, and the Partnership for Air Transportation Noise and Emissions Reduction. She described the Environmental Protection Agency's (EPA) Greenhouse Gas (GHG) Reporting Program. Its goal is to collect accurate and timely data on GHG emissions to facilitate future policy decisions. She reported that the EPA Office of Transportation and Air Quality is keenly interested in continued assistance from NASA for CO₂ technology benefits assessments.

Ms. Blakey presented for the Council's consideration a proposed observation on cooperation between NASA, EPA, and the FAA. She explained that policymakers were concerned that the three agencies may pursue different environmental tracks. The Committee, however, is pleased with the way that NASA is interfacing with the FAA. After discussion, the Council approved the following observation:

The Committee is encouraged to see strong coordination and collaboration in research between NASA and FAA concerning environmental impacts of aviation and hopes that collaboration will continue. The Committee also believes NASA's technical expertise and research can lend support to EPA's standards setting and regulatory policy initiatives as related to aviation, such as greenhouse gas emissions, and therefore supports a more proactive collaboration with EPA.

Ms. Blakey discussed NASA's workforce recruitment. Hiring at NASA Centers seems to be geographically local. Efforts have been made, however, to recruit and hire from outside those local geographic boundaries. She presented a chart showing how most new hires for the LaRC had come from its local geographical area during the years 2006 through 2010. Col. Collins observed that it appeared from the chart that improvements have been made. Ms. Blakey described a proposed new subcommittee, the Unmanned Aircraft Systems (UAS) Subcommittee, that the Aeronautics Committee is considering establishing at the request of the ARMD Associate Administrator. The UAS Subcommittee will review and assess NASA's approach, progress, and plans for developing strategies and capabilities that reduce technical barriers related to the safety and operational challenges associated with enabling routine UAS access to the national airspace.

Dr. Ford thanked Ms. Blakey for her presentation.

NASA Annual Ethics Briefing

Dr. Ford introduced Mr. Adam Greenstone, Esq., Office of General Counsel, NASA Headquarters. Mr. Greenstone briefed the Council Members on the legal requirements pertaining to ethics. Each Council Member is a Special Government Employee (SGE) and the government's ethics laws apply to all SGEs. Mr. Greenstone described the standards of conduct and the criminal statutes on ethics. Any Council Member having a specific issue should notify Ms. Rausch and obtain legal advice from the NASA Office of General Counsel.

Dr. Ford thanked Mr. Greenstone for his presentation.

NAC Work Plan for 2011; General Discussion

Dr. Ford asked each Committee Chair to discuss their Committee's work plan for the coming year. Mr. Kohrs reported that the Exploration Committee would observe ESMD's work, primarily its Heavy Lift Launch Vehicle, Crew Vehicle, and COTS Program, as the organization winds down and is merged with SOMD. The Committee will look at the Commercial Crew requirements with the other committees. It will pay close attention to the organization change with ESMD and SOMD. In response to a question from Col. Collins, Dr. Ford advised that the Council's advice has not been solicited on the proposed merger of the two NASA Mission Directorates, however, that would not preclude the Council from offering its advice. He added that the merger would probably affect the NAC's committee structure. Dr. Ford requested that updated work plans be sent to him. Dr. Kennel described the studies that will be performed by the Space Studies Board (NRC) of the National Research Council. These will include the first ever decadal survey on life and microgravity sciences. He and Dr. Colladay of the Aeronautics and Space Engineering Board (ASEB) of the NRC will undertake a study on space goals for post-2020.

Col. Collins reported that the Space Operations Committee would work on ISS operations, the Shuttle transition, future NASA human launch systems (with the Exploration Committee), commercial launch systems (with the Commercial Space Committee), the Kennedy Space Center spaceport modernization, and human flight operations.

Dr. Huntress stated that the Science Committee would work on structuring the science advisory committee to provide science advice to both SMD and ESMD. There are two relevant NRC decadal surveys to be released shortly, and the Committee wants to examine SMD's plans to implement the recommendations from those decadal surveys over the next 10 years. The Committee wants to examine the effects of budget problems on SMD's implementation of the decadal recommendations and provide advice on how to handle

those situations. It also wants to examine the international projects and provide advice, as necessary, on NASA's role in those missions.

Mr. Alexander described the work plan for the Commercial Space Committee. It will review and advise on how to best optimize NASA's organizational elements and address cultural issues to effectively encourage and promote the development of a commercial space industry. It will review NASA's strategy and plans for stimulating a commercial space industry and advise NASA on how to stimulate, encourage and partner with commercial space. The Committee will review and advise on NASA's strategy for partnering and cooperating with other Federal agencies on commercial space. It will also provide advice on how NASA should define "commercial space." Dr. Ford advised that the committees could make changes to their work plans during the year, and that Mr. Bolden might also make changes to the work plans. Col. Collins noted that the Space Operations Committee occasionally comes across items that are safety issues; when that happens, the Committee refers the item to Adm. Joseph Dyer, Chair of NASA's Aerospace Safety Advisory Panel (ASAP), and his members. Dr. Ford advised that the NAC does not work safety issues to the same level of detail as the ASAP. However, if there is an operational issue relating to safety, then the NAC Space Operations Committee or Explorations Committee should look into it. He further explained that the NAC is not the safety watchdog or, for that matter, any kind of watchdog.

Ms. Blakey described the Aeronautics Committee's CY 2011 work plan. The Committee will review and advise on NASA's goals and progress for mitigating the environmental impact of aviation. It will review and advise on the initial implementation of the research initiatives for the UAS integration program in the national airspace and for the Verification and Validation of Flight Critical Systems Program. It will review and advise on the development of an NASA Aeronautics Research Mission Directorate (ARMD)-wide methodology to support the portfolio investment decision-making process. It will review and advise on the transfer of NextGen technologies to the implementation and user community and on international collaborations.

Mr. Perkins reported that the EPO Committee would continue to support Mr. Leland Melvin's efforts to identify external partnerships and streamline the partnership process to make it easier to bring it new partners in to work with NASA. It will help to develop a unifying message to be communicated internally and externally about NASA's role in the program for Science, Technology, Engineering and Mathematics (STEM). It will work with the NASA Office of Communications to translate the strategic vision of NASA that is evolving now, into a public message. The Committee will explore, with the Office of Communications, whether public outreach should be tiered to address different audiences in a more focused manner. It will continue to work with the Commercial Space Committee to better understand the COTS program and procurement process in order to integrate public outreach without imposing an unnecessary bureaucratic burden. The EPO Committee wants to work with the Aeronautics Committee to explore ways to get the aeronautics message out to the world.

Ms. Dyson reported that the Technology and Innovation Committee will work to better understand the technology roadmaps and see what recommendations could be helpful. Dr. Colladay advised that the deadline for input on the roadmaps would be towards the end of April. The Committee will continue to follow the progress of and provide advice to the OCT. Dr. Ford counseled that giving OCT focused and actionable advice as they move forward with the implementation OCT's new technology programs would be very helpful. Ms. Dyson stated that the Committee would meet with Center Chief Technologists, Center by Center. It will look at the technology transfer and knowledge management processes and will work with Dr. Smarr to understand the information technology infrastructure to see how it can be helpful, rather than constraining. It also will look into concerns recently expressed by NASA's Inspector General (IG) about NASA's Small Business Innovation Research (SBIR) Program.

Mr. Hanisee reported that the Audit, Finance, and Analysis Committee had looked at several issues raised in a recent letter to Congress from NASA's IG. The Committee's focus has been on remediating old problems and getting the Agency onto a sound financial footing so that the NASA leadership team, when it appears before Congress, is not immediately on the defensive. The Committee's singular goal has been to obtain a clean, unqualified audit opinion, and for the Agency to be removed from the GAO's high risk list. The Committee will continue to focus on contractor-held PP&E and will continue to look at unfunded

environmental liabilities, including asbestos remediation. There will be issues involving the Agency's financial systems and oversight, and the Committee will work to make sure that the Agency is keeping its systems fresh, updated, and the relevant. The Committee also wants to better familiarize itself with the work being performed by NASA's Deputy Chief Financial Officer, Mr. Andrew Hunter, who is responsible for budget, strategy, and performance.

Dr. Colladay described his work plans with the ASEB of the NRC. He will chair a committee to assist NASA's Chief Technologist to finalize the technology roadmaps. The goal is to develop a consensus on the roadmaps both within and outside the Agency. There are 14 roadmaps and each will address 15 to 20 different technologies. Comments from the public are encouraged and may be submitted at: http://sites.nationalacademies.org/DEPS/ASEB/DEPS_059552. The Office of Management and Budget (OMB), Congress, and the White House Office of Science and Technology Policy (OSTP) are anticipating the results from this effort.

Dr. Ford thanked the Committee Chairs for describing the work plans for their respective committees. He announced that the next NAC meeting will be in Cleveland, Ohio, May 4-6, 2011, at NASA's Glenn Research Center (GRC). That meeting will be followed by a NAC meeting in Mountain View, California, August 3-5, 2011, at NASA's Ames Research Center (ARC). Dr. Ford noted that all the NAC committees would be meeting at the ARC meeting, and that there will be a reception for the committee members on Tuesday, August 2. There will be a separate ARC tour and dinner for the Council on Wednesday, August 3. The committees may organize their own ARC tours as desired.

Public Input

Dr. Ford gave the public an opportunity to comment. There were no comments.

Adjournment

Dr. Ford thanked the NASA Advisory Council Members for their participation in the meeting. He thanked the Council's Executive Director, Ms. Diane Rausch, and the Council's support staff for their assistance.

The meeting was adjourned.

**NASA ADVISORY COUNCIL
NASA Headquarters
Program Review Center, Room 9H40
Washington, DC 20546**

PUBLIC MEETING

February 10-11, 2011

Agenda

Thursday, February 10, 2011

8:00 – 8:02 am	Call to Order, Announcements	Ms. Diane Rausch, Executive Director NASA Advisory Council, NASA HQ
8:02 – 8:10 am	Remarks by Council Chair	Dr. Kenneth Ford, Chair NASA Advisory Council
8:10 – 8:45 am	Welcome by NASA Administrator	Mr. Charles Bolden NASA Administrator
8:45 – 9:30 am	Independent Review of NASA Space Communications and Navigation (SCaN)	Mr. James Adams, Chair (<i>by phone</i>) Ms. Dolly Perkins, Member SCaN PIR Standing Review Board
9:30 – 10:15 am	International Space Station (ISS) Transition to Research Operations	Mr. Mark Uhran, Assistant Associate Administrator, Space Operations Mission Directorate, NASA HQ
10:15– 10:30 am	Break	
10:30 – 11:15 am	Technology and Innovation Committee Report	Ms. Esther Dyson, Chair
11:15 – 12:00 pm	Space Operations Committee Report	Col. Eileen Collins, Chair
12:00 – 1:00 pm	Lunch (<i>Council only</i>)	
1:00 – 1:45 pm	Science Committee Report	Dr. Wesley Huntress, Chair
1:45 – 2:00 pm	Information Technology Infrastructure Committee Update	Dr. Kenneth Ford
2:00 – 2:45 pm	Exploration Committee Report	Mr. Richard Kohrs, Chair
2:45 – 3:00 pm	Break	
3:00 – 3:45 pm	Education and Public Outreach Committee Report	Mr. Lars Perkins, Interim Chair
3:45 – 4:30 pm	Audit, Finance, and Analysis Committee Report	Mr. Robert Hanisee, Chair
4:30 – 5:00 pm	Public Input	
5:00 pm	Adjourn	

Friday, February 11, 2011

8:00 am	Call to Order	Ms. Diane Rausch, Executive Director NASA Advisory Council
8:00 – 8:02 am	Announcements	Dr. Kenneth Ford, Chair NASA Advisory Council
8:02 – 8:45 am	Commercial Space Committee Report	Mr. Brett Alexander, Chair
8:45 – 9:30 am	Aeronautics Committee Report	Ms. Marion Blakey, Chair
9:30 – 10:30 am	NASA Annual Ethics Briefing	Mr. Adam Greenstone Office of General Counsel, NASA HQ
10:30 – 10:45 am	Break	
10:45 – 11:30 am	NAC Work Plan for 2011; General Discussion	Dr. Kenneth Ford, Chair NASA Advisory Council
11:30 am – 12:00 pm	Public Input	
12:00 pm	Adjourn	

NASA ADVISORY COUNCIL MEMBERS
February 2011

Role	Council Members
Chair – NASA Advisory Council	Dr. Kenneth M. Ford <i>Founder and Director, Florida Institute for Human and Machine Cognition</i>
Chair – Aeronautics Committee	The Honorable Marion Blakey <i>Chief Executive Officer, Aerospace Industries Association</i>
Chair – Audit, Finance, and Analysis Committee	Mr. Robert M. Hanisee, CFA <i>Managing Director, Trust Company of the West</i>
Chair – Commercial Space Committee	Mr. Brett Alexander <i>President, Commercial Spaceflight Federation</i>
Chair – Interim Education and Public Outreach Committee (thru July 15, 2011)	Mr. Lars Perkins <i>Entrepreneur</i>
Chair – Exploration Committee	Mr. Richard Kohrs <i>NASA (Ret.)</i>
Chair – Information Technology Infrastructure Committee	Dr. Lawrence Smarr <i>University of California, San Diego</i>
Chair – Science Committee	Dr. Wesley T. Huntress, Jr. <i>Director Emeritus, Geophysical Laboratory, Carnegie Institute of Washington</i>
Chair – Space Operations Committee	Col. Eileen M. Collins (USAF Ret.) <i>NASA Shuttle Pilot and Commander (Ret.), Aerospace Consultant, President of Space Presentations, LLC</i>
Chair – Technology and Innovation Committee	Ms. Esther Dyson <i>EDventure Holdings</i>
Ex Officio Members	Dr. Charles F. Kennel <i>Chair, Space Studies Board, National Research Council, National Academies</i> Dr. Raymond S. Colladay <i>Chair, Aeronautics and Space Engineering Board, National Research Council, National Academies</i>

NASA ADVISORY COUNCIL
NASA Headquarters
February 10-11, 2011

MEETING ATTENDEES

NASA Advisory Council:

Ford, Kenneth, *Chair*

Rausch, P. Diane, *Executive Director*

Alexander, Brett

Colladay, Raymond

Collins, Eileen

Dyson, Esther

Hanisee, Robert

Huntress, Wesley

Kennel, Charles

Kohrs, Richard

Perkins, Lars

Director, Institute of Human and Machine
Cognition

NASA Headquarters

Commercial Spaceflight Federation

Aeronautics and Space Engineering Board,

National Academies

Space Presentations, LLC

EDventure Holdings

Trust Company of the West

Carnegie Institute of Washington

Space Studies Board, National Academies

NASA (Ret.)

Entrepreneur

NASA Attendees:

Bolden, Charles

Cooke, Doug

Cooper, Larry

Donegal-Feldman, Shaun

Emond, John

Feeley, T. Jens

Frazier, Robert

Green, Mike

Harrus, Plena

Irving, Rick

Joshi, Jhendra

Keeton, Jacob

King, Marla

Ladwig, Alan

New, Michael

Noble, Sarah

Petersen, Frank

Purritt, Eric

Roberts, Margaret

Robinson, Shawanda

Sciman, Sam

Shin, Jaiwon

Siegel, Bette

Smith, Trent

Uhran, Mark

Vanderling, Dennis

Woodard, Dan

Younes, Badri

NASA/HQ

NASA/HQ

NASA/HQ

NASA/HQ

NASA/HQ

NASA/HQ

NASA/HQ

NASA/HQ

NASA/HQ

NASA/HQ

NASA/HQ

NASA/HQ

NASA/HQ

NASA/HQ

NASA/HQ

NASA/HQ

NASA/HQ

NASA/HQ

NASA/HQ

NASA/HQ

NASA/HQ

NASA/HQ

NASA/HQ

NASA/HQ

NASA/HQ

NASA/GSFC

NASA/HQ

NASA/HQ

Other Attendees:

Arnold, Steven
Boyd, Robert
Connor, Anne
Cowing, Keith
Deikmann, Andreas
Devine, Charles
Eckert, Paul
Floyd, Mary
Frankel, David
Hovarth, Scott
Johnson, Chris
King, Doug
Kniffen, Don

Mackey, Bill
Malay, Jon
Moloney, Michael
O'Kelly, Sebastian
Perkins, Dolly
Rogers, Richard
Slater, Frank
Spitler, Connie
Van Kesselaer, Frank

Applied Physics Laboratory (APL)
McClotsky
Aerospace Industries Association (AIA)
NASA Watch
European Space Agency
Metro Washington Mensa
Boeing
Zantech IT Services
[Consultant]
Lockheed Martin
International Institute of Space Law (IISL)
Museum of Flight, Seattle
Universities Space Research Association
(USRA)
European Space Agency
Lockheed Martin
Space Studies Board, National Research Council

Stellar Solutions
Stellar Solutions
Northrup Grumman
Northrup Grumman
Harris Corp.

**NASA ADVISORY COUNCIL
NASA Headquarters
February 10-11, 2011**

LIST OF PRESENTATION MATERIAL

- 1) Space Communications and Navigation (SCaN) Program Implementation Review (PIR)
Standing Review Board (SRB) Assessment [Perkins]
- 2) International Space Station Cooperative Agreement with a Non-Profit Organization
[Uhran]
- 3) Technology and Innovation Committee Report [Dyson]
- 4) Space Operations Committee Report [Collins]
- 5) Science Committee Report [Huntress]
- 6) Exploration Committee Report [Kohrs]
- 7) Education and Public Outreach Committee Report [Perkins]
- 8) Audit, Finance, and Analysis Committee Report [Hanisee]
- 9) Commercial Space Committee Report [Alexander]
- 10) Aeronautics Committee Report [Blakey]
- 11) NASA Annual Ethics Briefing [Greenstone]